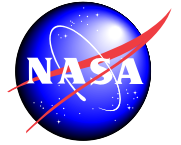


CALIPSO Mission Status Update

Payload Status

November 13, 2007

SSAI/ Ron Verhappen
SSAI/Robert Borchardt
NASA / David MacDonnell
NASA / Mike Cisewski

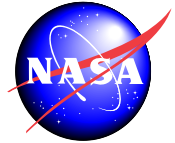


Wide Field Camera

SSAI/ Ron Verhappen



WFC Overview



- ❑ No FDIR Events
- ❑ All Temperatures and Voltages are Nominal
- ❑ No Adjustments required

WFC HS

WFC Health and Status

CALIPSO

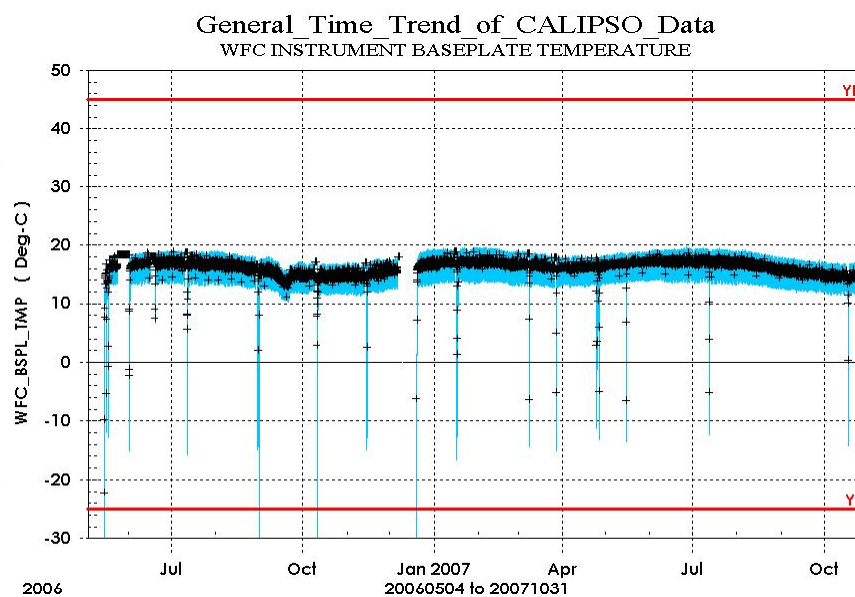
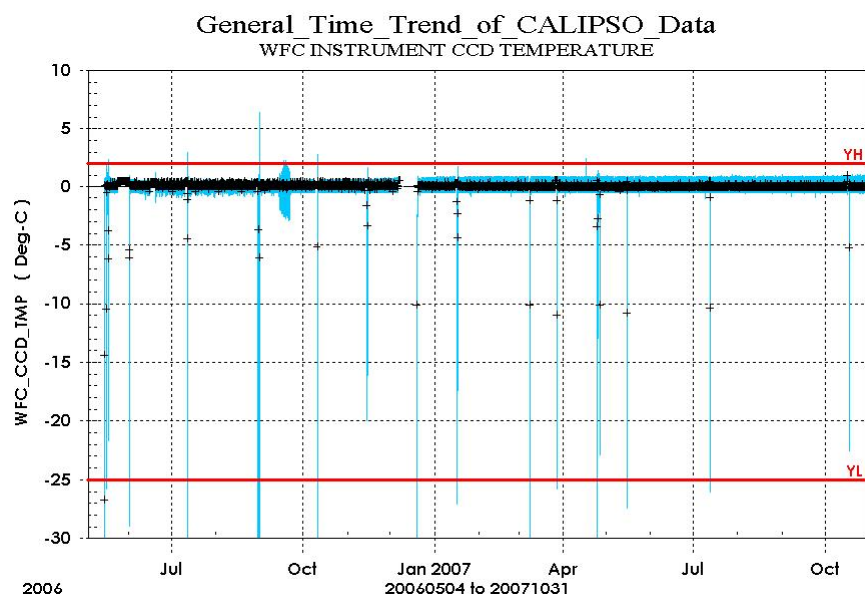
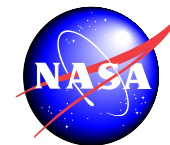
General Status		Temperature / Voltage Monitors	
Commands Accepted:	0	CCD Temp:	0.35C
Commands Rejected:	0	Baseplate Temp:	18.17C
Data Collection On:	TRUE	WFC Back Cover Temp:	16.94C
Frames Processed:	462016	Spare Temp:	0.00C
WFC Commands Received:	92	+8 Volt Power Supply:	7.90V
WFC Commands Rejected:	0	-9 Volt Power Supply:	-9.00V
WFC Readout Frame Counter:	401	+4 Volt Power Supply:	3.90V
WFC Mode:	AUTONOMOUS	-5 Volt Power Supply:	-4.90V
WFC Submode:	AUTONOMOUS	WFC Power Relay Status:	CLOSED

WFC Instrument Status Word		WFC Configuration	
WFC Reset:	FALSE	Serial Number:	1
RAM Execution:	FALSE	Software Version:	101
Watchdog Timeout:	FALSE	Image Center Column:	258
Output Serial Register In Use:	SPARE	Image Center Row:	254
Stack Error:	FALSE	Number of High Res Pixels:	40
Memory Download Active:	FALSE	Number of Low Res Pixels:	20
Sync Timing Error:	FALSE	Commanded Frame Time:	290
Sync Timeout:	FALSE	Actual Frame Time:	288
ROM Failure:	FALSE	Exposure Time:	47
RAM Failure:	FALSE		
EEPROM Fail Flag:	FALSE		

Close

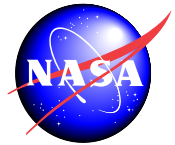


WFC Temperatures

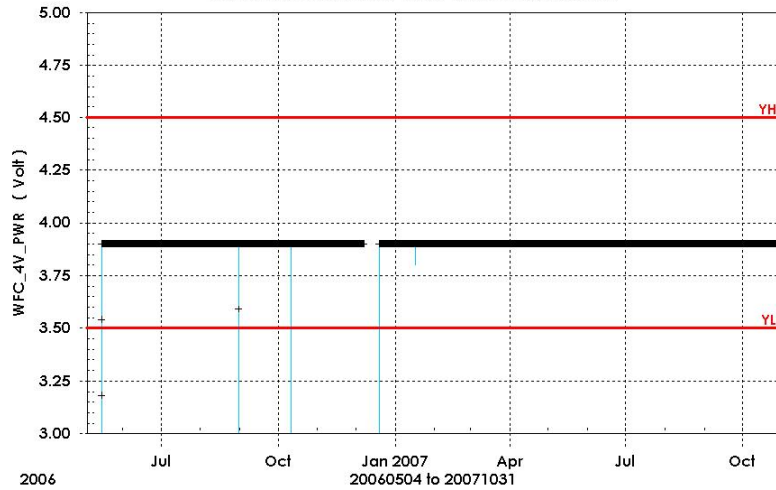




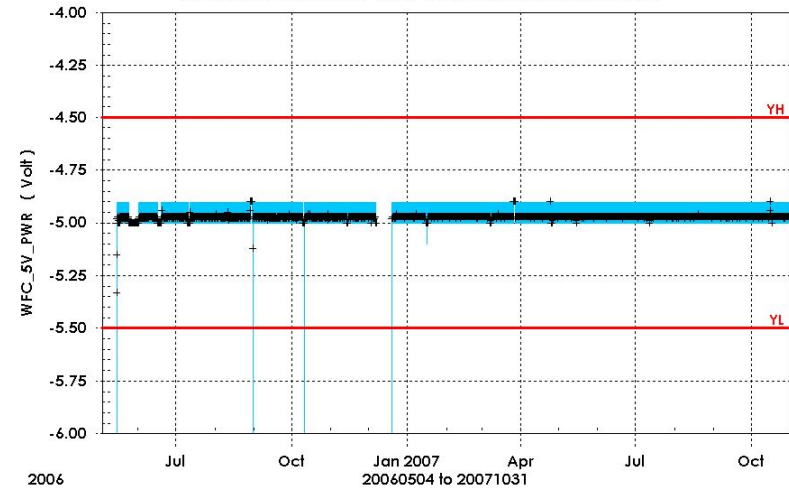
WFC Voltages



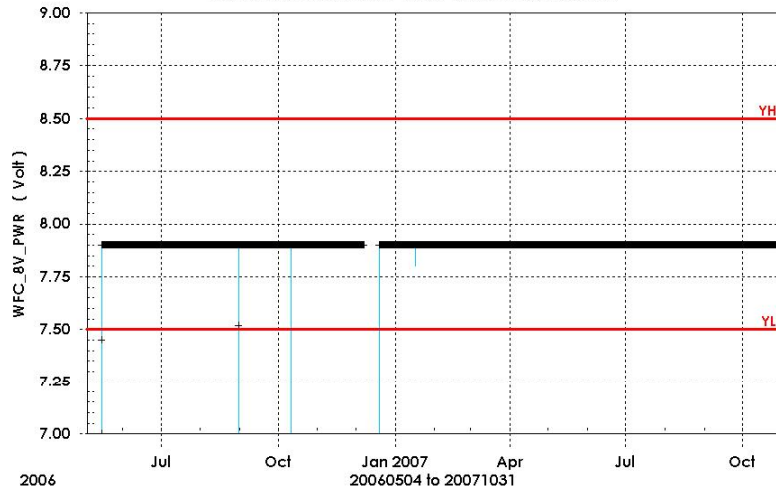
General Time Trend of CALIPSO Data
WFC INSTRUMENT 4 VOLT POWER MONITOR



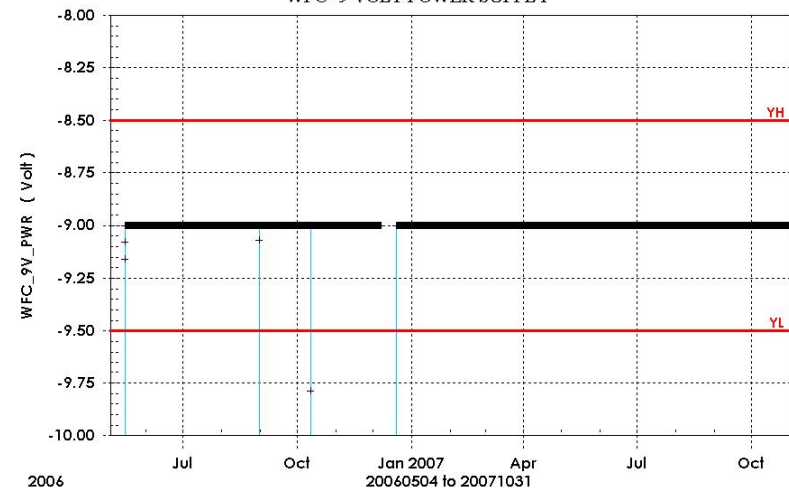
General Time Trend of CALIPSO Data
WFC INSTRUMENT -5 VOLT POWER SUPPLY MONITOR

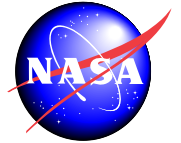


General Time Trend of CALIPSO Data
WFC INSTRUMENT 8 VOLT POWER MONITOR



General Time Trend of CALIPSO Data
WFC -9 VOLT POWER SUPPLY



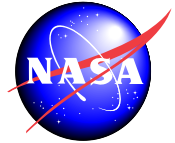


Imaging Infrared Radiometer

SSAI/ Ron Verhappen



IIR Health



- ❑ Power Consumption Nominal
- ❑ No Adjustment required since CTA set point update
- ❑ No FDIR Events

IIR HS

IIR Health and Status **CALIPSO**

General Status

Commands Accepted:	0
Commands Rejected:	0
Frames Processed:	659808
IIR Mode:	ACQUISITION
IIR Submode:	ACQUISITION
Mode Acquired by SIB:	ACQUISITION
Stepper Motor Fail:	FALSE
ISM Fail:	FALSE
Integration Time (usec):	111

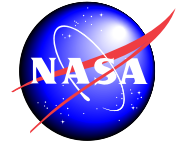
Temperature / Voltage Monitors

ISM DC/DC Conv. PWA Temp:	16.63C
ISM DC/DC Conv. Sec. Voltage:	5.07V
Cntrl. Box DC/DC Conv. Voltage:	4.86V
ISM Radiator Temp:	7.53C
ISM Microbolometer Temp:	19.22C
Cntrl. Box DC/DC Conv. Temp:	29.46C
IIR Radiator Temp:	20.21C
IIR Power Relay Status:	CLOSED

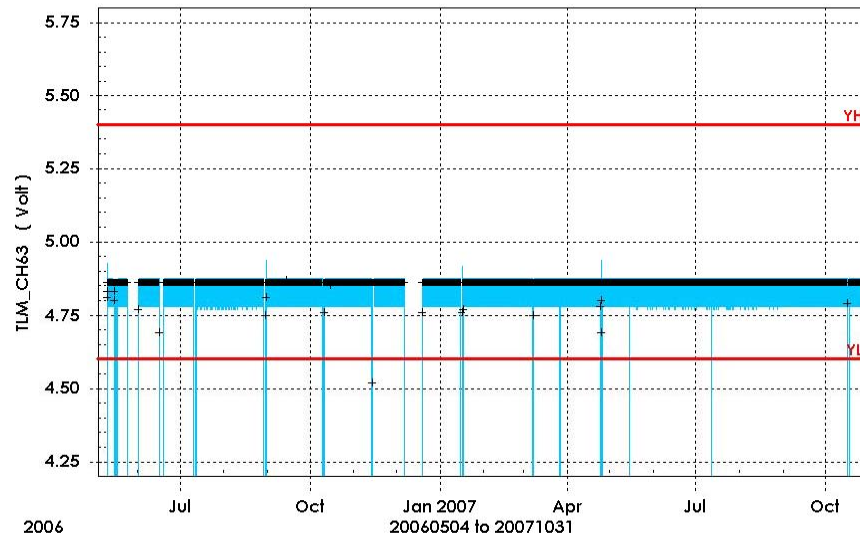
Close



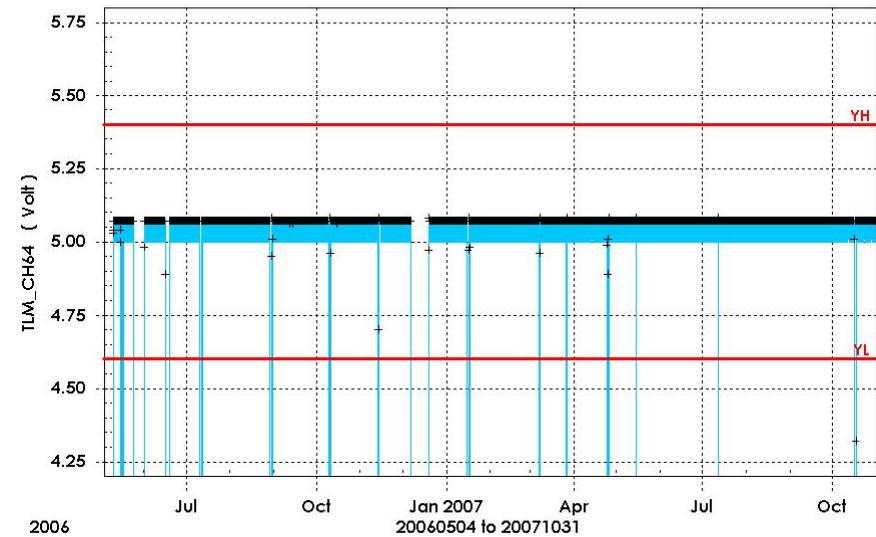
IIR Voltages

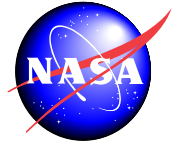


General Time Trend of CALIPSO Data
IIR CB AND ISM DC/DC CONV SECONDARY VOLT



General Time Trend of CALIPSO Data
IIR ISM DC/DC CONV SECONDARY VOLTAGE



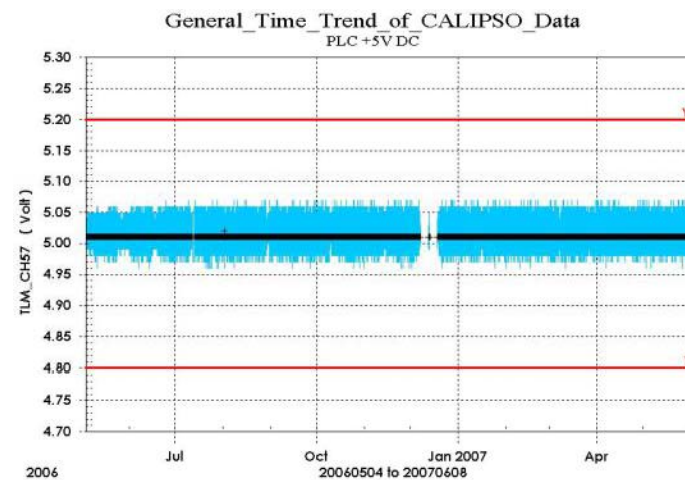
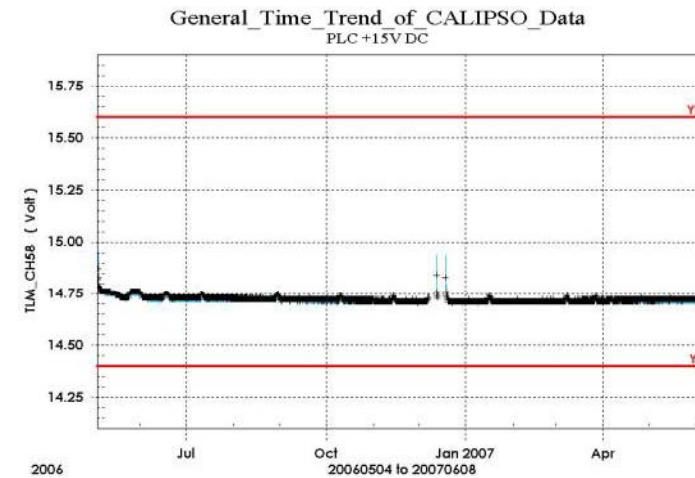
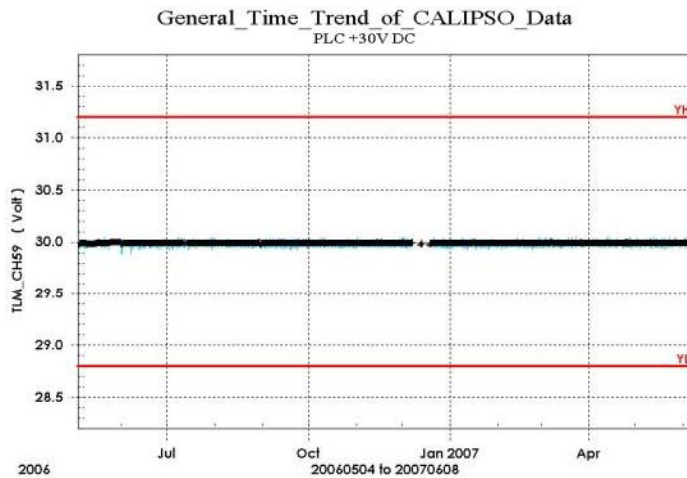
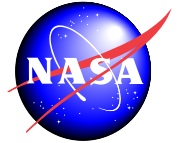


Payload Controller

SSAI/ Ron Verhappen

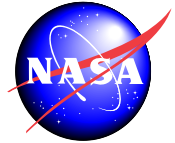


PLC Voltages

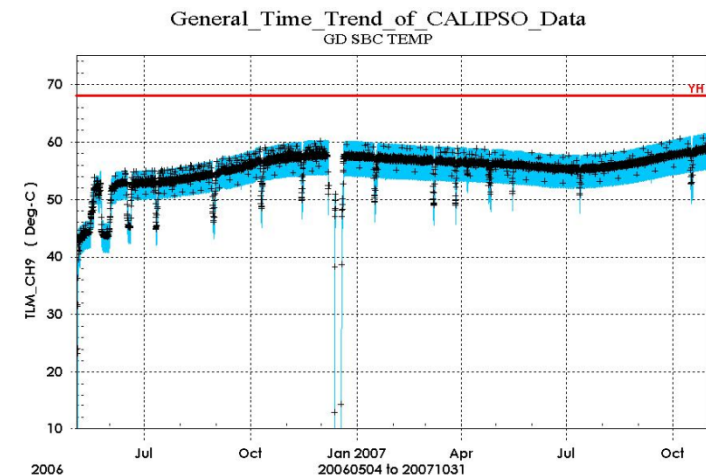
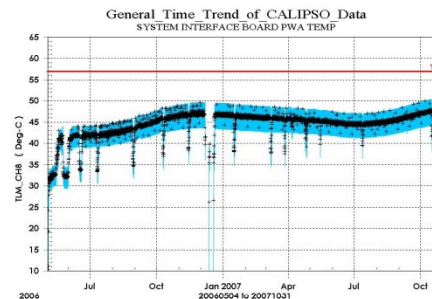
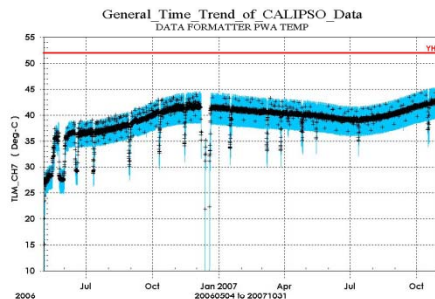
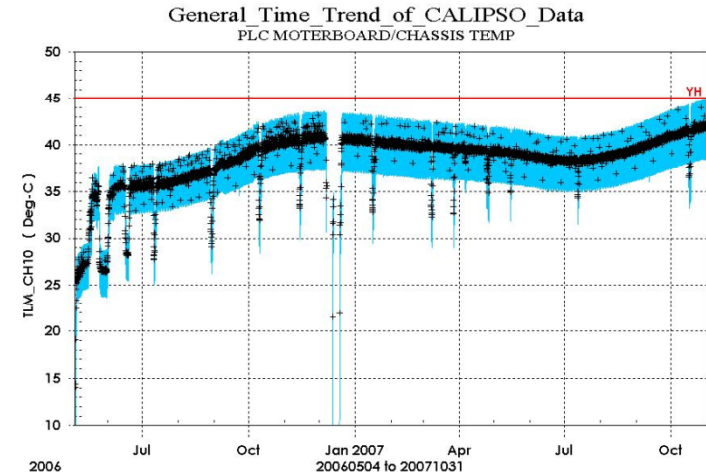
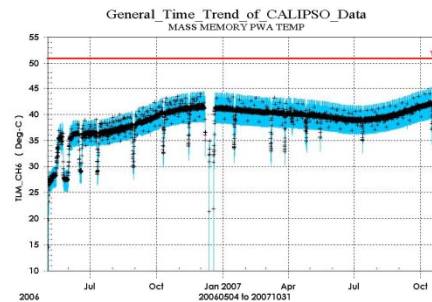
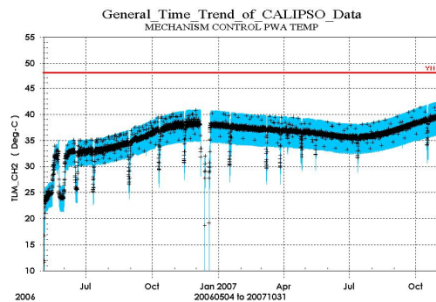




PLC Temperatures

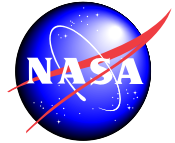


- Temperatures are nominal
 - Excluding the LVPS

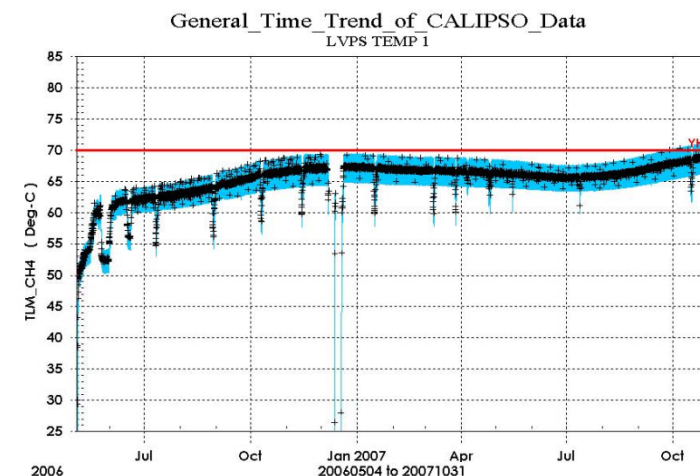
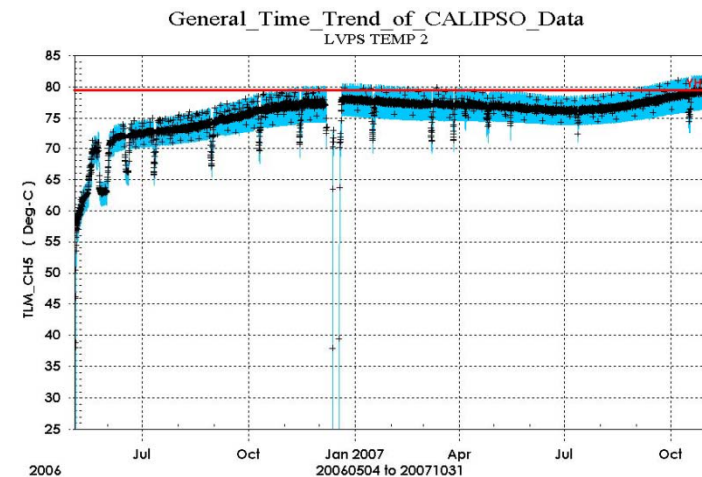




Low Voltage Power Supply (LVPS) (CALOPS0025N)

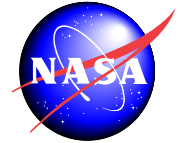


- ❑ LVPS TLM_CH5 Approaching Red FDIR Limit during High Beta Angles
- ❑ Flight Red Limit increased by 2°C.
- ❑ Mission Request to Increase PLC CTA during Solar Flares
 - Implemented
- ❑ Mission Request to Increase PLC CTA Temperature during Operations in Review
 - Same philosophy as CTA heater setting for the active laser during operations

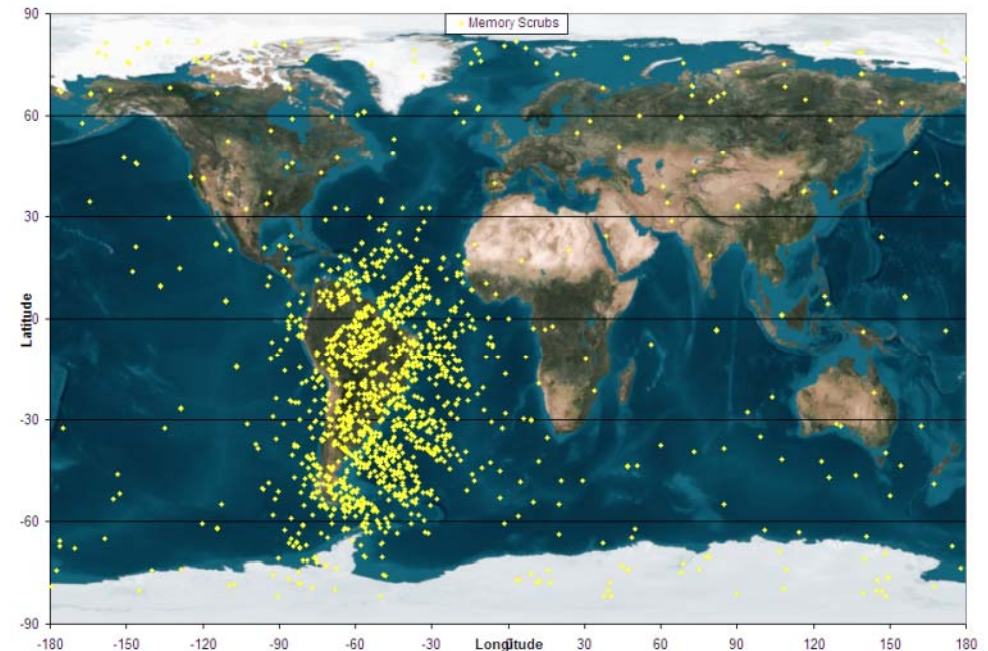
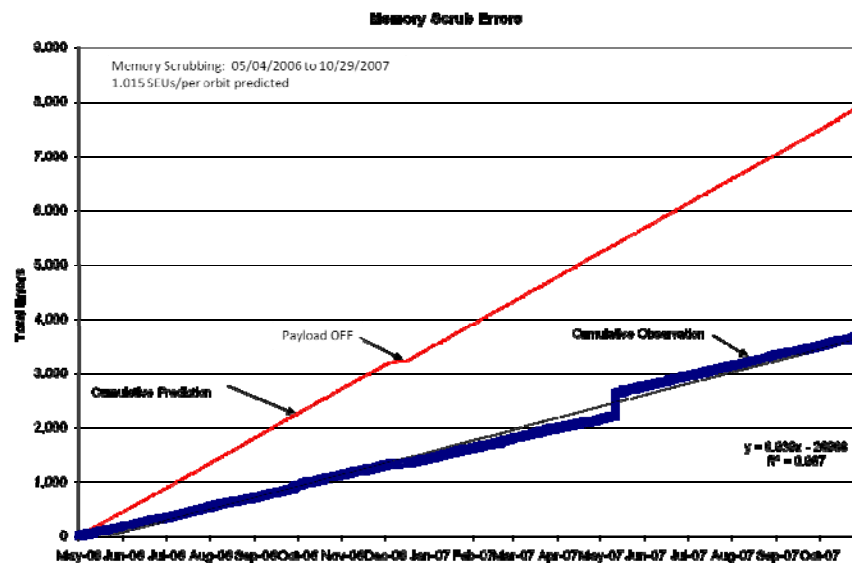




PLC Radiation Effects



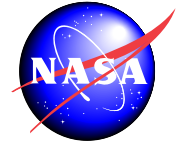
- PLC operating nominally in the on-orbit radiation environment
- Memory scrub errors & CPU Miscompares are well under predictions



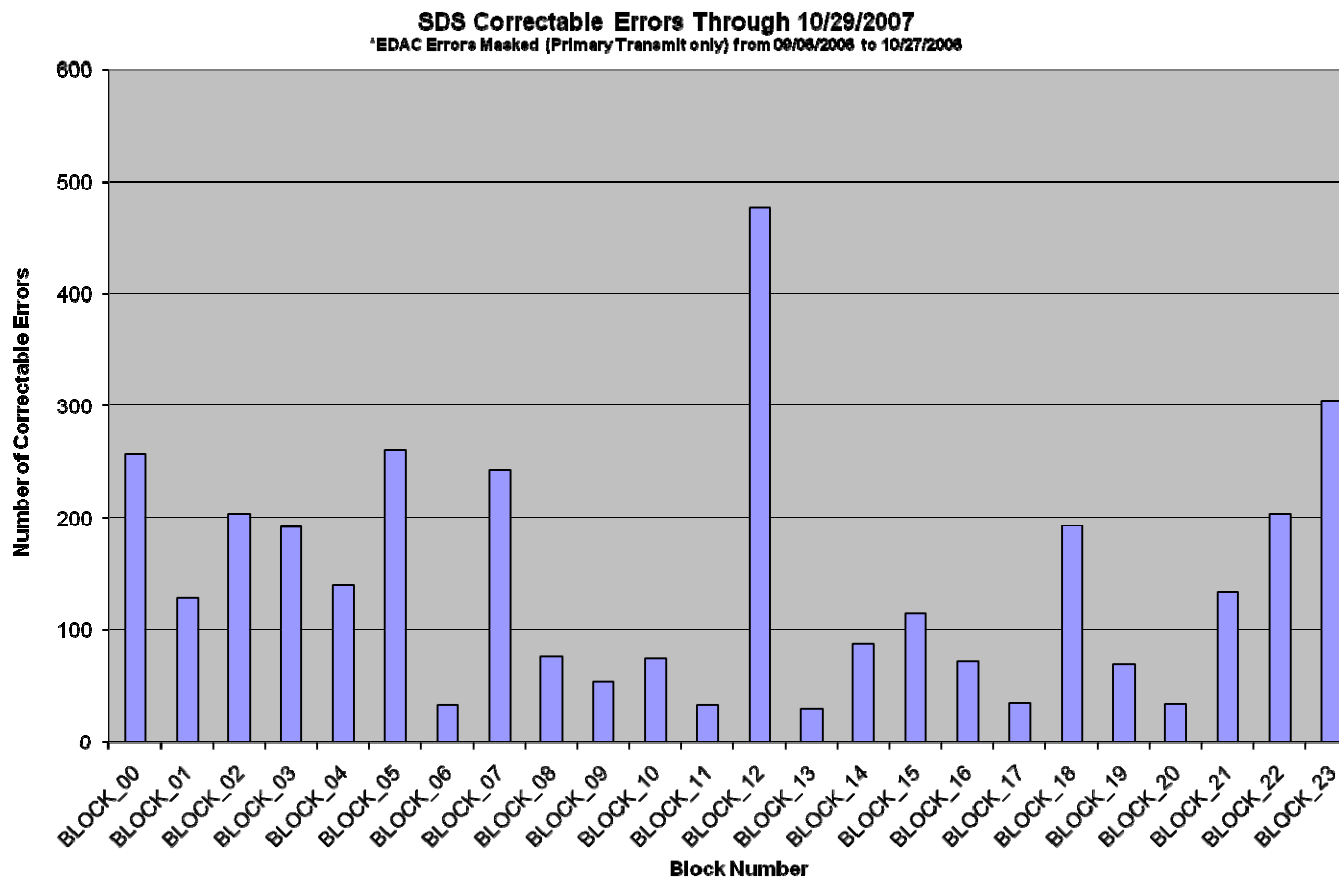
- One Event in the SAA caused 436 Memory Scrubbing Errors

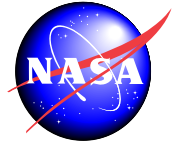


SDS Status (CALOPS0020N)



- All transmits since the interrupt patch have been nominal
- All Blocks are still uncorrectable error free and active



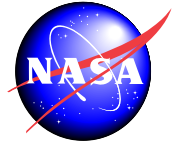


CALIOP LIDAR

SSAI/ Ron Verhappen



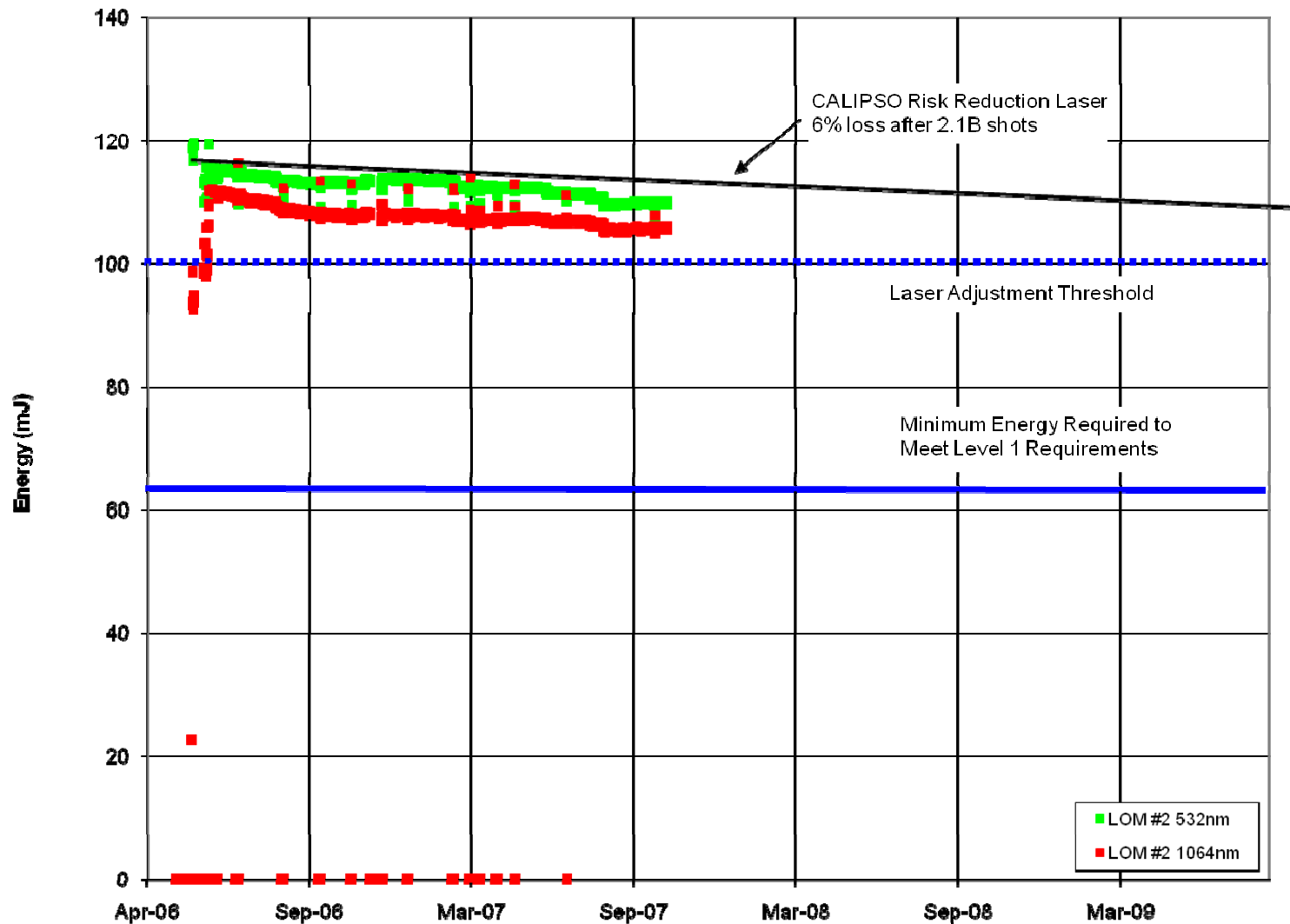
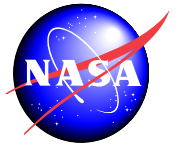
Agenda



- Review Overall Laser Performance
 - Total Energy
 - Energy Balance Trends
 - Thermal Stability
 - Laser Pressure
 - Boresight Trend
- LIDAR Detector Performance
 - Signal Noise
 - Bits Trend
 - Calibrations
- Laser Energy Spikes Investigation Status
 - Discussion of behavior
 - Current Status

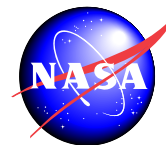


Laser Energy Trends

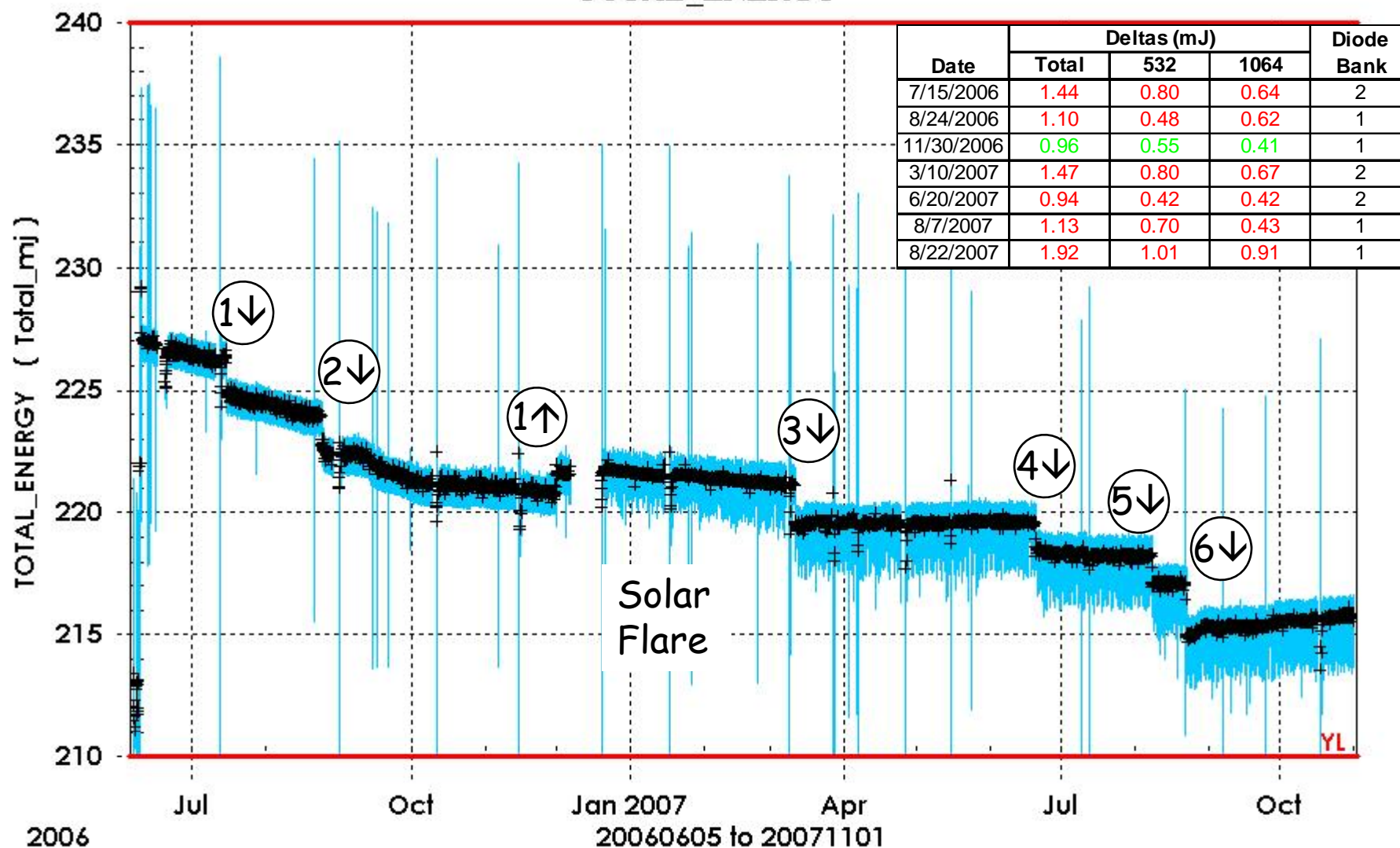




Laser Energy Zoom

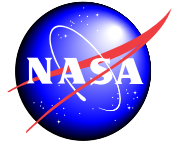


Lom2_Time_Trend_of_CALIPSO_Data TOTAL_ENERGY





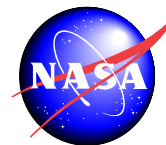
Laser Management Approach



- ❑ Quarterly Laser Team Meetings (last meeting September, 2007)
 - Members are experts from NASA, Fibertek and Ball
 - Meeting Results
 - ✓ Laser continues to operate very well
 - ✓ No need to make any adjustments
- ❑ Daily Laser Monitoring
 - Output power and thermal parameters
- ❑ Weekly Trending of Laser Parameters
 - Laser Pressure
 - Output Power
 - Laser Heater Duty Cycle Trends

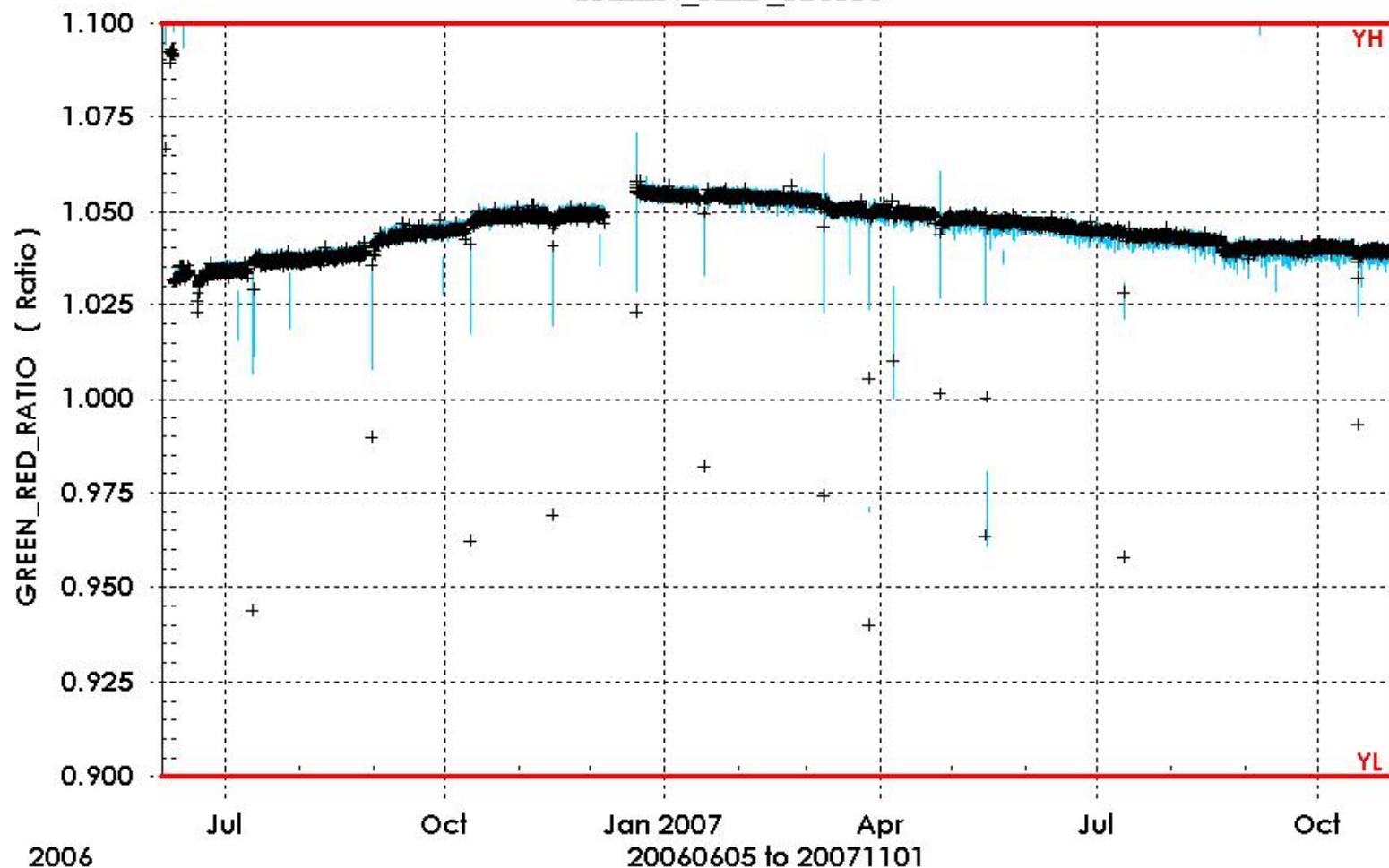


Green / Red Ratio



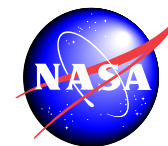
Lom2_Time_Trend_of_CALIPSO_Data

GREEN_RED_RATIO

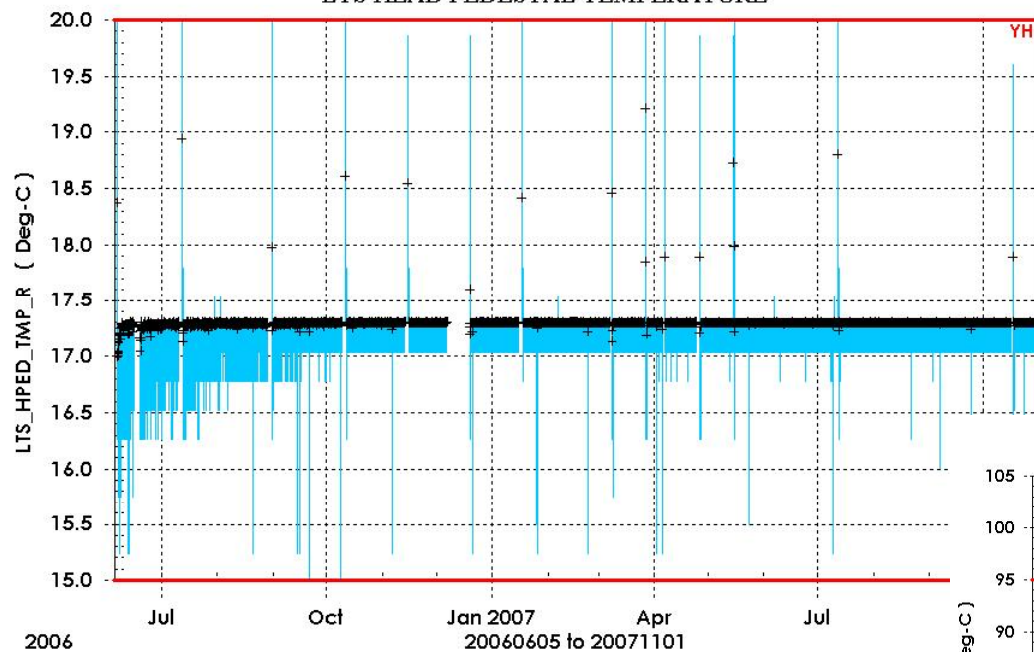




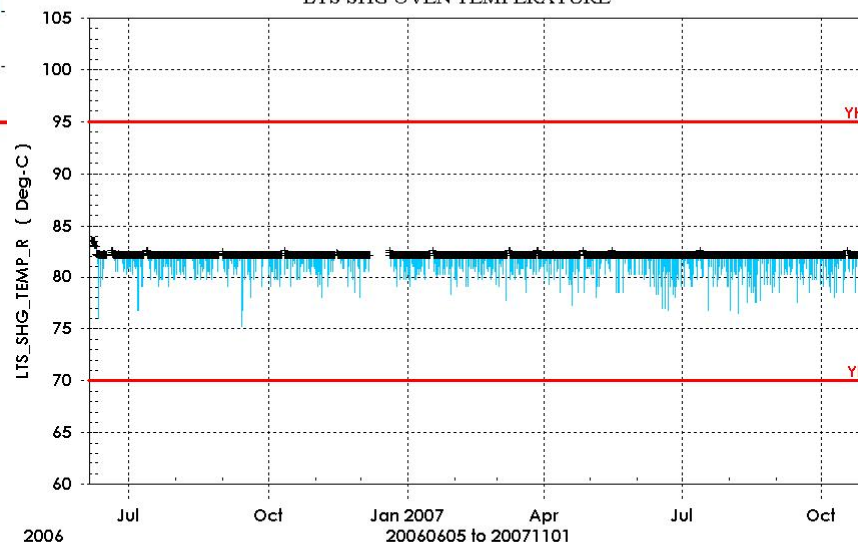
Pedestal @ SHG Temperature Trends



Lom2_Time_Trend_of_CALIPSO_Data
LTS HEAD PEDESTAL TEMPERATURE

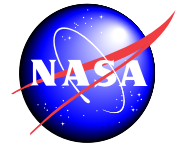


Lom2_Time_Trend_of_CALIPSO_Data
LTS SHG OVEN TEMPERATURE

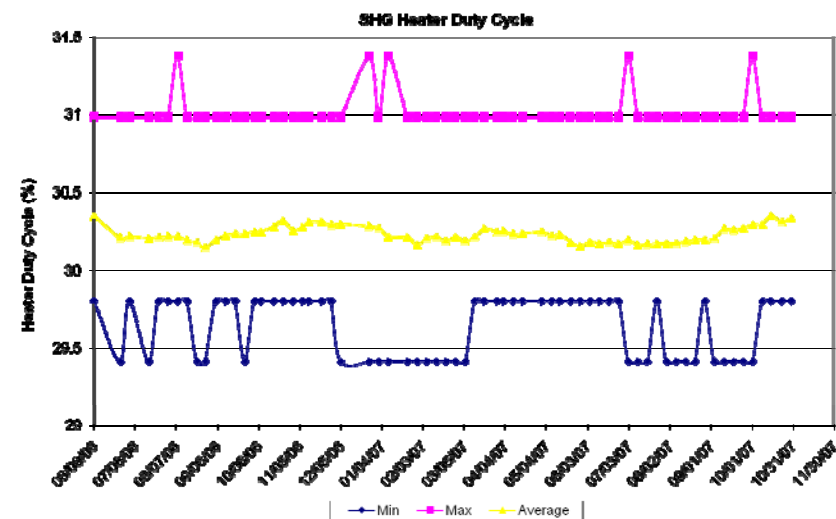
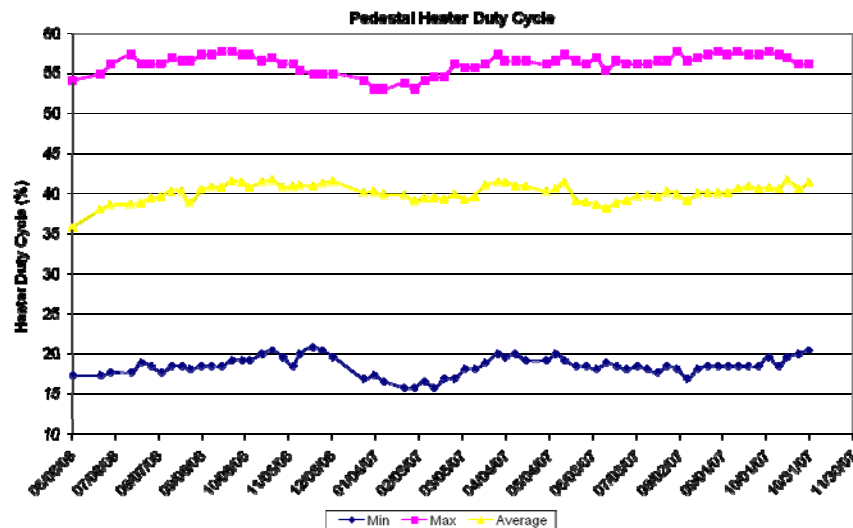
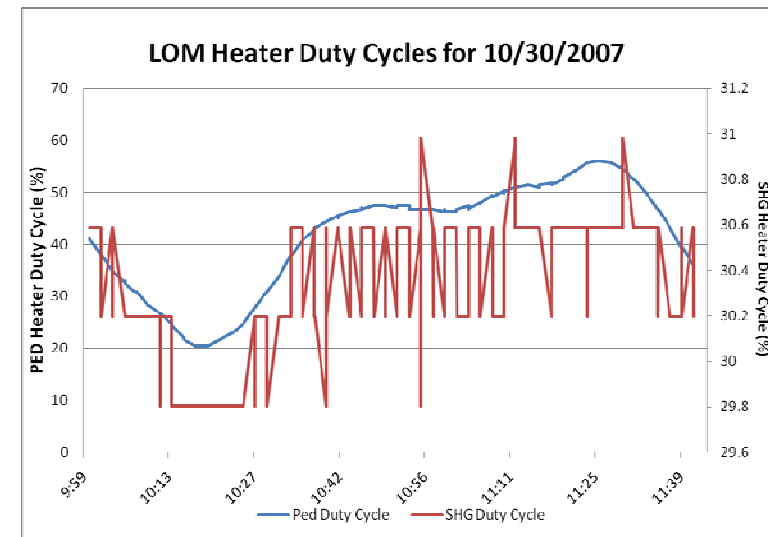




LOM Heater Duty Cycle Trends

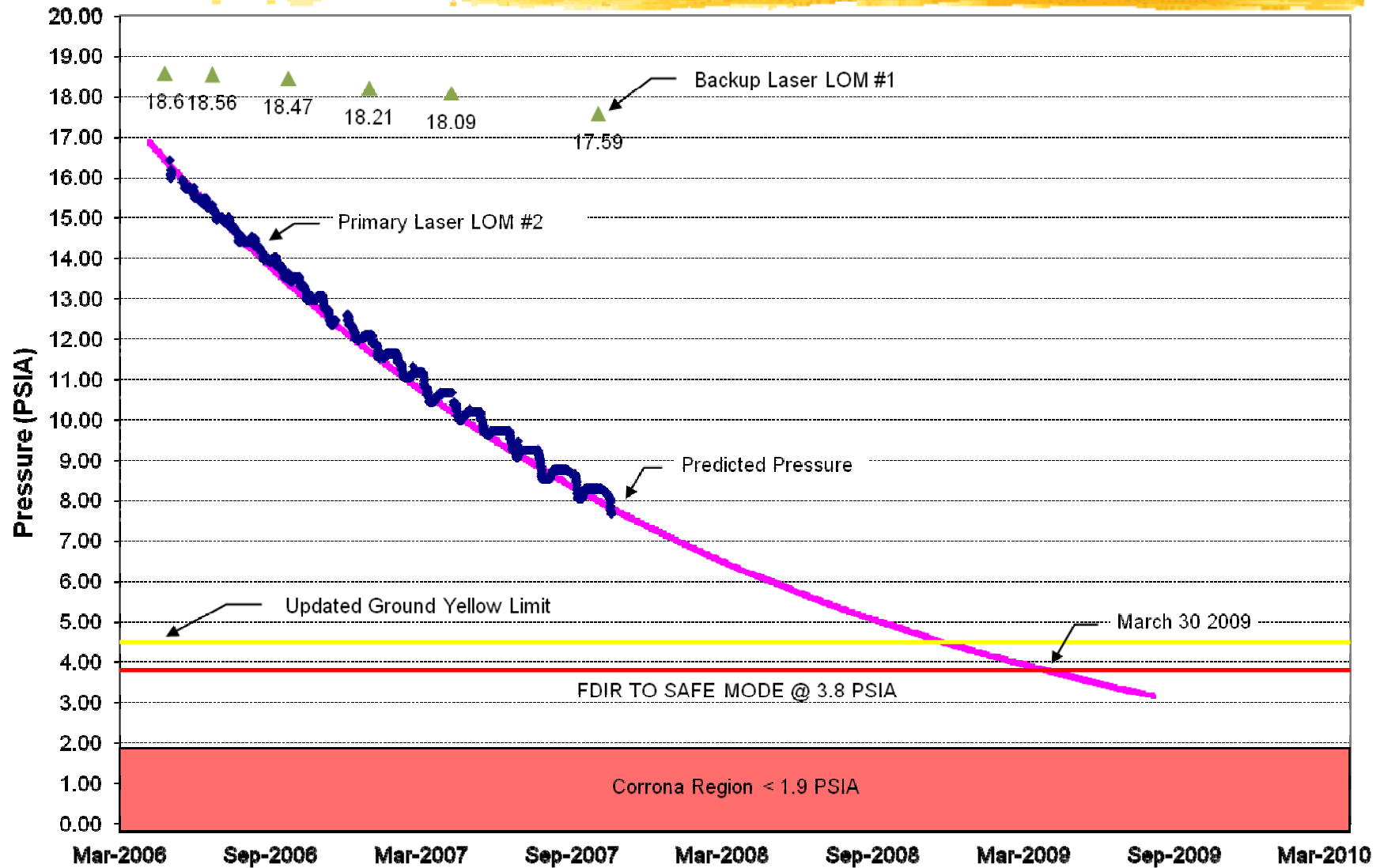
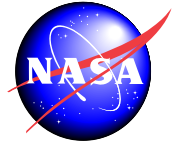


- Data acquired over an entire orbit
 - Conducted Weekly



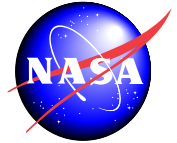


LOM Pressure Trends



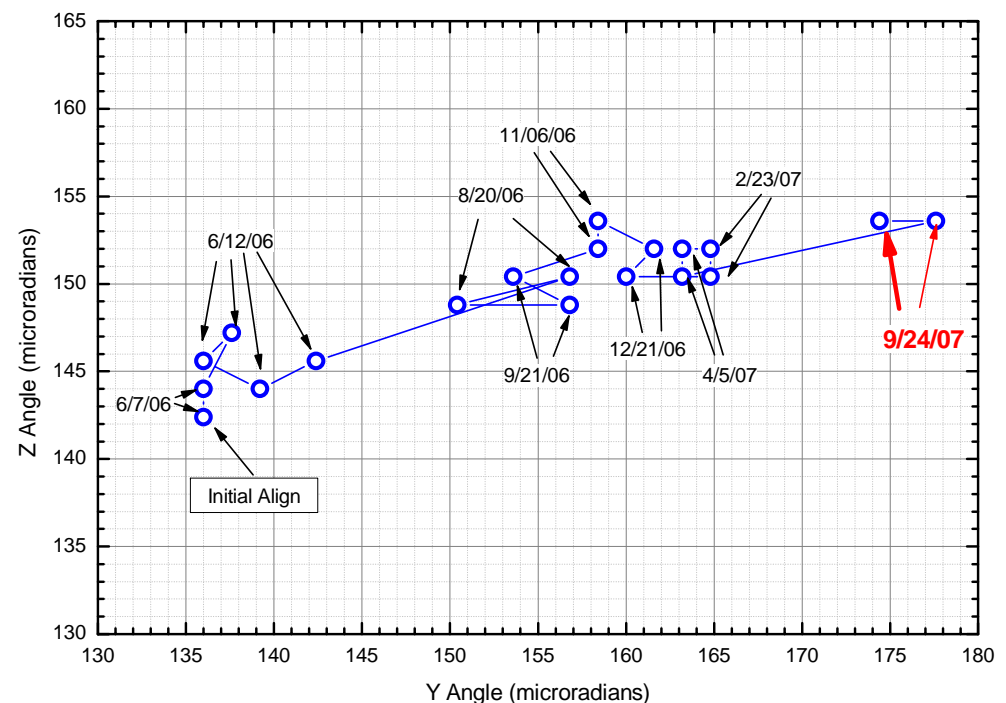


Boresight Trend



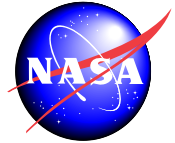
- Long Term stability looks good
 - latest alignment shows a slight reversal of the previous trend in aligned positions
- September 24, 2007 Aligns
 - Completed in 2 and 1 iterations
 - Net angular movement of 11.7 microradians
- Investigating Calibration constant stability over an orbit.

CALIPSO Lidar
History of Positions After Boresight Aligns
Updated 9-24-07

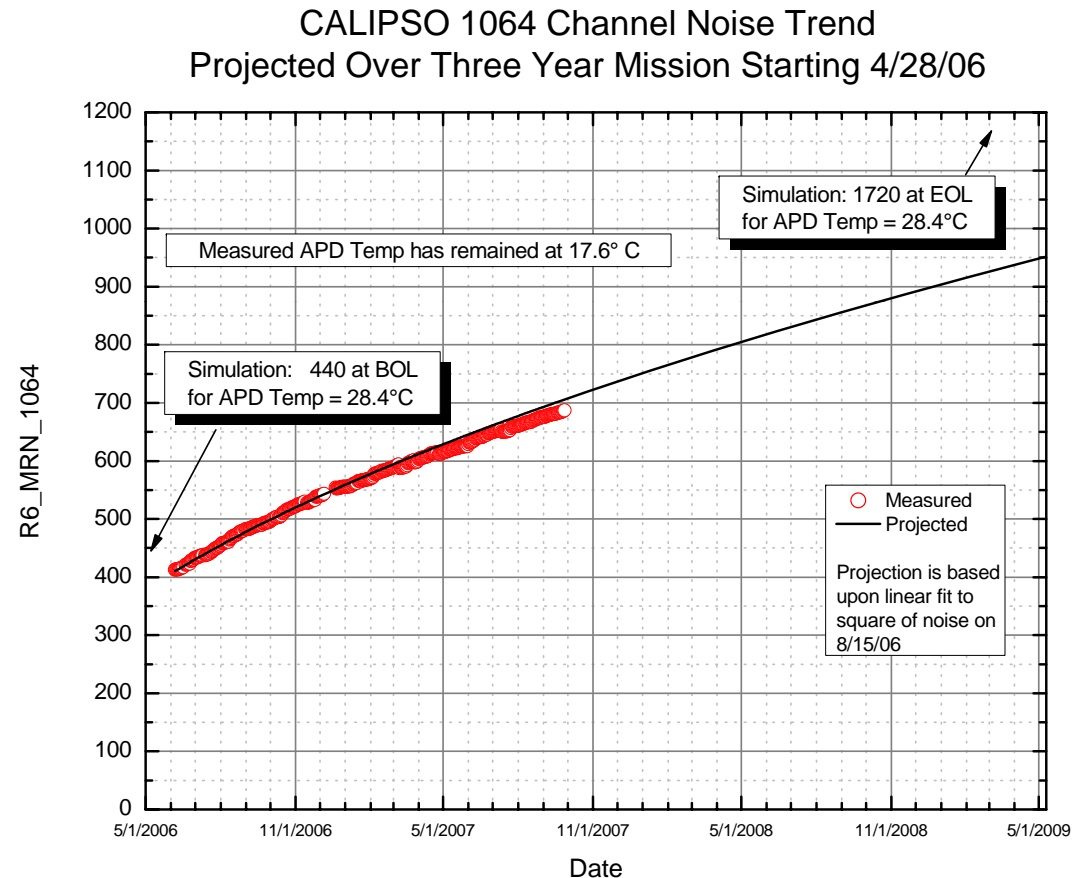




1064 Dark Noise Trend



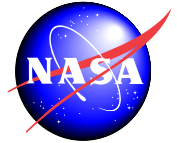
- Trend data is falling slightly below the original trend line.
- Detector is heater controlled to a set point of 17°C
 - No Temperature variations



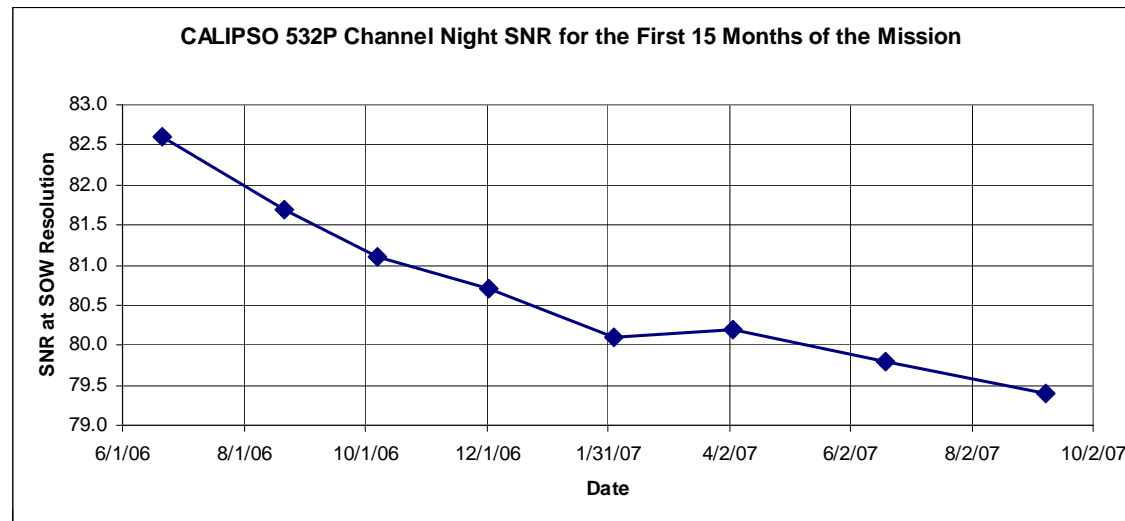
Updated 9/28/07



532 SNR Trend

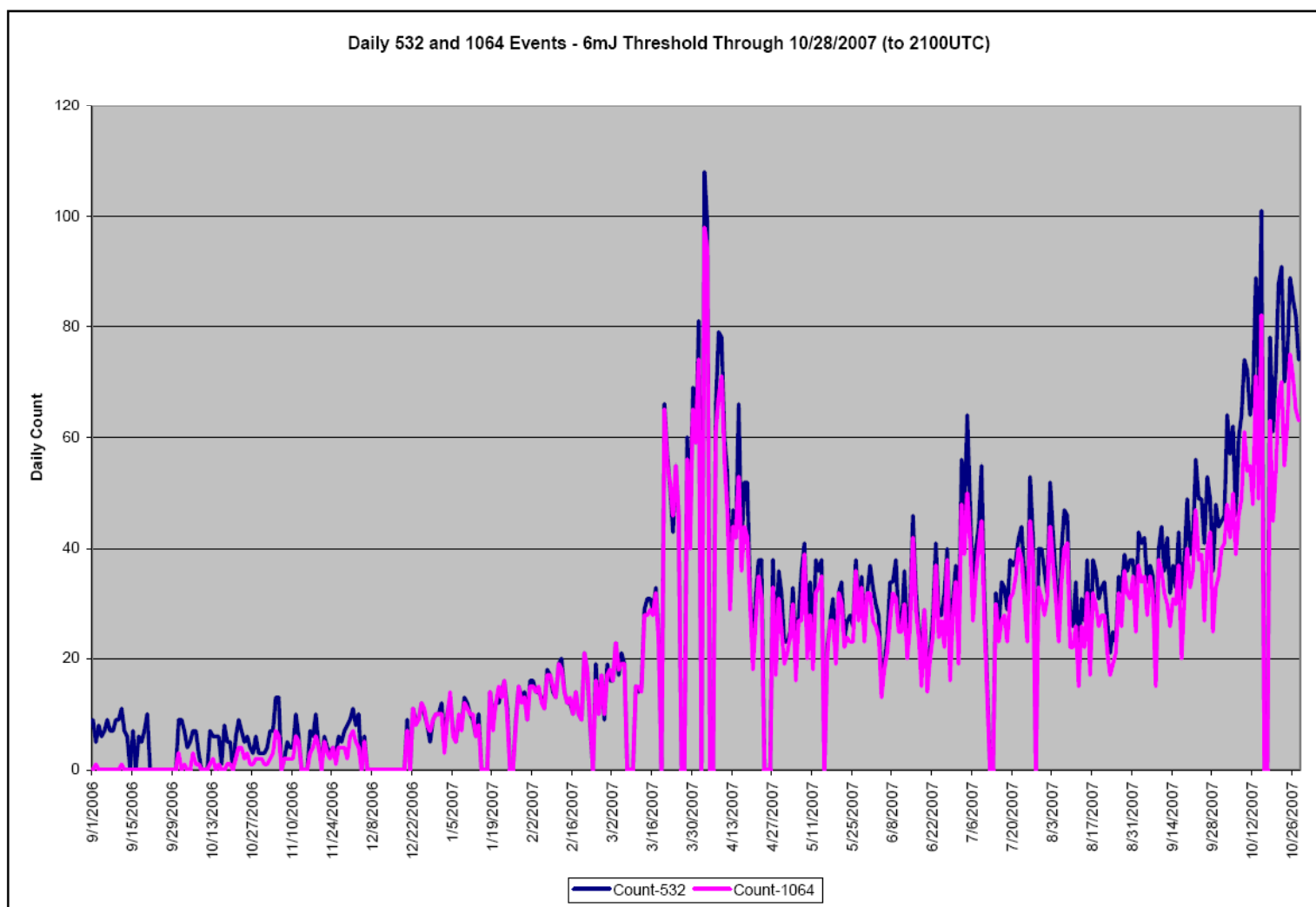
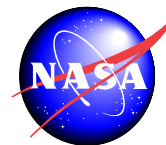


- ❑ SNR remains well over 50%
- ❑ Total Drop of 4%
 - Only 2% after normalizing for Laser Energy Drop



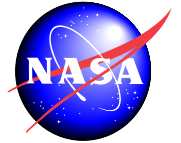


Spike Trends





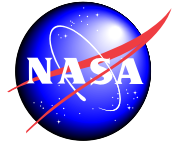
LIDAR Highlights



- ❑ CALIOP subsystems have operated for 1.5 year with no adjustments after the initial setup.
 - Laser (Energy loss is expected and understood)
 - ✓ Spikes do not represent a laser health risk
 - Amplifier gains and offsets
 - Detector gains
 - Etalon temperature
- ❑ Signal to Noise Ratio is Higher then Expected
- ❑ Depolarization performance exceeds requirements
 - < 1% cross-talk
- ❑ HST screening conducted MWF
 - Laser operations have been inhibited 11 times



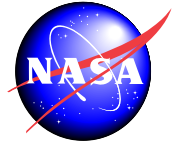
Backup Laser Status



- ❑ Laser 2 continues to be the primary Laser
 - The laser will be operated until the internal pressure reaches 3.8 PSIA (Double the Corona pressure)
- ❑ Laser 1 Health checks
 - Conducted 6 times to date with nominal results
 - ✓ Next check planned in April '08
 - ✓ Laser powered and placed in standby mode
 - High Voltage applied, but no Diode pumping



Future Plans



☐ Predictions show that Laser 2 will need to be turned off in the Spring of 2009

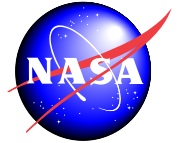
- Transition to laser 1 will require 2 weeks of activity
 - ✓ Thermally Balancing
 - ✓ Energy Balancing
 - ✓ Lidar Tuning

☐ Detailed planning will begin in Fall of 2008 (REVEX)

- Schedule of laser activation will need to account for
 - ✓ Team workload and holidays
 - ✓ A-train inclination maneuver execution
 - ✓ Validation campaigns
 - ✓ Technical needs to optimize laser life



Conclusion



CALIPSO Payload performance continues to be outstanding